

299-W15-212 (A7510) Log Data Report

Borehole Information:

Borehole: 299-W15-212 (A7510)		Site: 216-T-25 Trench			
Coordinates (WA State Plane)		GWL (ft)¹: Not deep enough		GWL Date: 12/17/2002	
North	East	Drill Date	TOC² Elevation	Total Depth (ft)	Type
136,234.195 m	566,545.765 m	Oct. 1982	206.931 m	102	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	2.85	8 11/16	8	11/32	+2.85	101.5
The logging engineer measured the casing stick up using a steel tape. A caliper was used to determine the outside casing diameter. The inside casing diameter was measured using a steel tape. Measurements were rounded to the nearest 1/16 in. Casing thickness was calculated.						

Borehole Notes:

Borehole coordinates, elevation, and well construction information are from measurements by Stoller field personnel, HWIS³, and Chamness and Merz (1993). The logging engineer measured the depth-to-bottom reported above. Zero reference is the top of the 8-in. casing. Top of casing is evenly cut. A reference point survey "X" is located on top of the casing stickup. According to Chamness and Merz (1993), the borehole was grouted.

Logging Equipment Information:

Logging System:	Gamma 2A	Type:	SGLS (35%)
Calibration Date:	10/2002	Calibration Reference:	GJO-2002-383-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Logging System:	Gamma 1C	Type:	High Rate Detector
Calibration Date:	02/07/02	Calibration Reference:	GJO-2002-309-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3/Repeat		
Date	12/27/02	12/30/02	12/30/02		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	62.0	102.0	27.5		
Finish Depth (ft)	3.0	34.0	17.5		
Count Time (sec)	200	200	200		
Live/Real	R	R	R		

Log Run	1	2	3/Repeat		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A ⁴	N/A	N/A		
Pre-Verification	BA184CAB	BA185CAB	BA185CAB		
Start File	BA184000	BA185000	BA185042		
Finish File	BA184059	BA185041	BA185052		
Post-Verification	BA184CAA	BA185CAA	BA185CAA		
Depth Return Error (in.)	0	N/A	0		
Comments	No fine-gain adjustment.	No fine-gain adjustment.	Repeat section.		

High Rate Logging System (HRLS) Log Run Information:

Log Run	1	2/Repeat			
Date	01/07/03	01/07/03			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	34.0	34.0			
Finish Depth (ft)	29.0	30.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	1.0			
ft/min	N/A	N/A			
Pre-Verification	AC050CAB	AC050CAB			
Start File	AC051000	AC051006			
Finish File	AC051005	AC051010			
Post-Verification	AC053CAA	AC053CAA			
Depth Return Error (in.)	-0.5	-1.5			
Comments	No fine-gain adjustment.	No fine-gain adjustment.			

Logging Operation Notes:

Zero reference is the top of casing for both the SGLS and HRLS. Logging was performed with a centralizer installed on the both the SGLS and HRLS sondes. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (⁴⁰K, ²³⁸U, and ²³²Th) verifier with SN 082, and pre- and post-survey verification measurements were acquired for the HRLS in the ¹³⁷Cs verifier SN 1013. During SGLS logging, fine-gain adjustments were not needed to maintain the 1460-keV (⁴⁰K) photopeak at a pre-described channel.

Analysis Notes:

Analyst:	Henwood	Date:	02/24/03	Reference:	GJO-HGLP 1.6.3, Rev. 0
-----------------	---------	--------------	----------	-------------------	------------------------

SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day. The verification spectra were all within the control limits except file number BA185CAA. In this file, the full width half maxima for all three energy levels were above the respective upper control limit. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification

spectra as compared to the pre-run verification spectra for each day were between 1 and 6 percent of each other. Therefore, the data are provisionally accepted.

HRLS pre-run and post-run verification spectra were collected at the beginning and end of the day. The spectra were within the acceptance criteria for the field verification of the Gamma 1C logging system (HRLS).

Log spectra for both the SGLS and HRLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2AOct02.xls), using parameters determined from analysis of recent calibration data. Zero reference was the top of the 8-in. casing. The casing configuration was assumed to be one string of 8-in. casing to total depth (102 ft). The casing correction factor was calculated assuming a casing thickness of 0.322 in. This casing thickness is based on the published values for ASTM schedule-40 steel pipe (commonly used casing material at Hanford) and is consistent with the field measurement. A water correction was not needed or applied to the data.

Using the SGLS, dead time greater than 40 percent was encountered at 31 ft. Data from this depth were considered unreliable. At SGLS dead time greater than 40 percent, peak spreading and pulse pile-up effects may result in underestimation of activities. This effect is not entirely corrected by the dead time correction, and the extent of error increases with increasing dead time. SGLS dead time corrections were applied when dead time reached 10.5 percent. The HRLS was utilized to obtain data where the SGLS dead time exceeded 40 percent.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K , ^{238}U , and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs and ^{60}Co were the man-made radionuclides detected in this borehole. ^{137}Cs was detected near the ground surface (4 to 9 ft) with a maximum concentration of 1.4 pCi/g. ^{137}Cs was detected in the interval between 30- and 82-ft log depth with concentrations ranging from 0.2 pCi/g to 4,040 pCi/g. The highest concentration was measured at 31 ft. ^{60}Co was detected intermittently near its MDL of approximately 0.1 pCi/g in the interval from 43 through 54 ft.

Due to the method of well completion, SGLS results in this borehole may not reflect the distribution of the natural or man-made radionuclides in the formation. The presence of an annulus filled with grout around the casing greatly attenuates gamma rays originating in the surrounding formation. Results from this borehole may not reflect actual concentrations in the formation and should be used with caution.

The plots of the repeat logs generally demonstrate good repeatability of the data for both the man-made and natural radionuclides identified by the following energy peaks: 662, 1461, 1764, and 2614 keV. Although the concentrations repeat within the error of the respective measurements, the concentrations for ^{40}K and ^{137}Cs are systematically lower in the repeat section relative to the main log. These lower concentrations are caused by poor resolution of the photo peaks.

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

¹ GWL – groundwater level

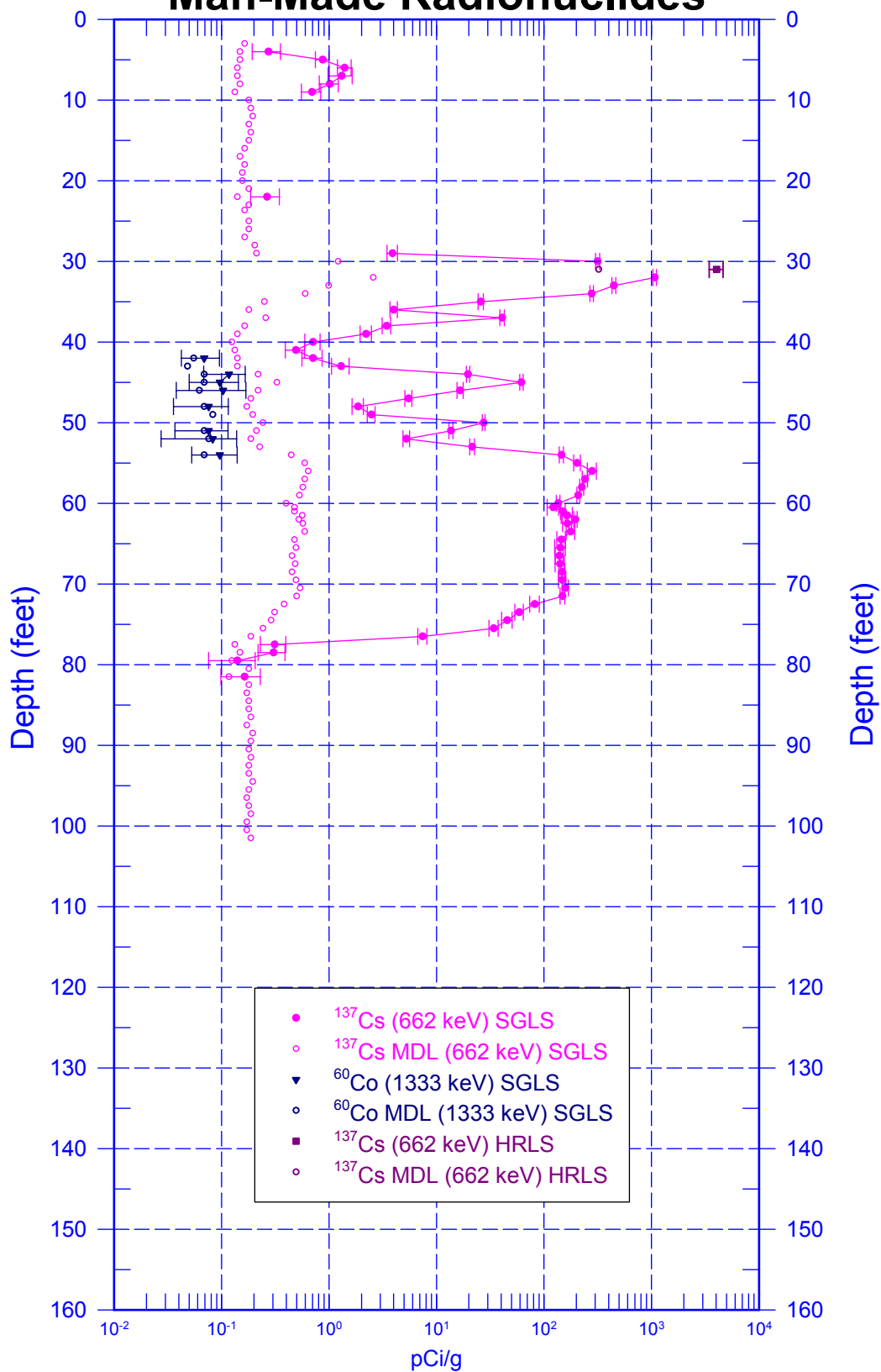
² TOC – top of casing

³ HWIS – Hanford Well Information System

⁴ N/A – not applicable

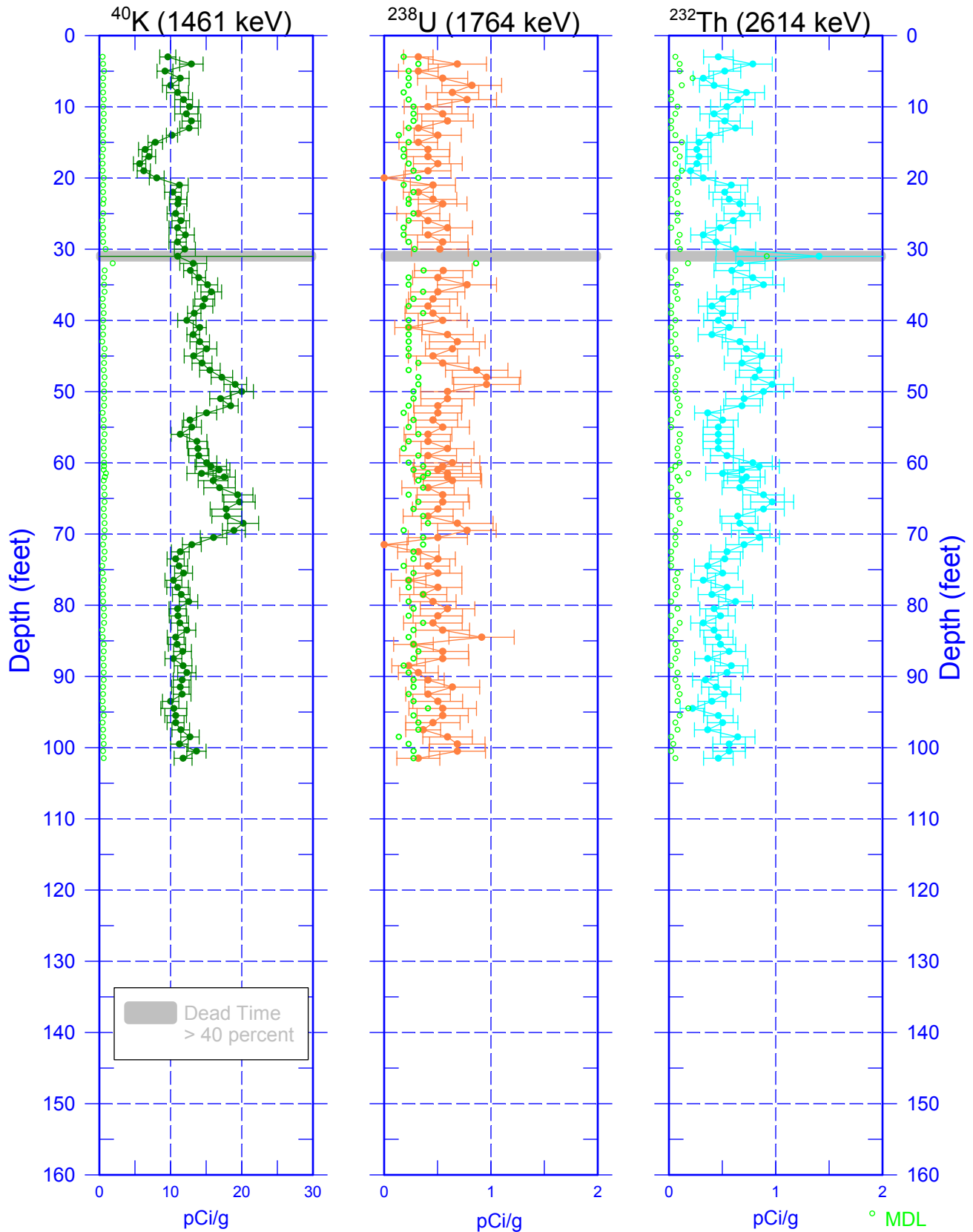
299-W15-212 (A7510)

Man-Made Radionuclides

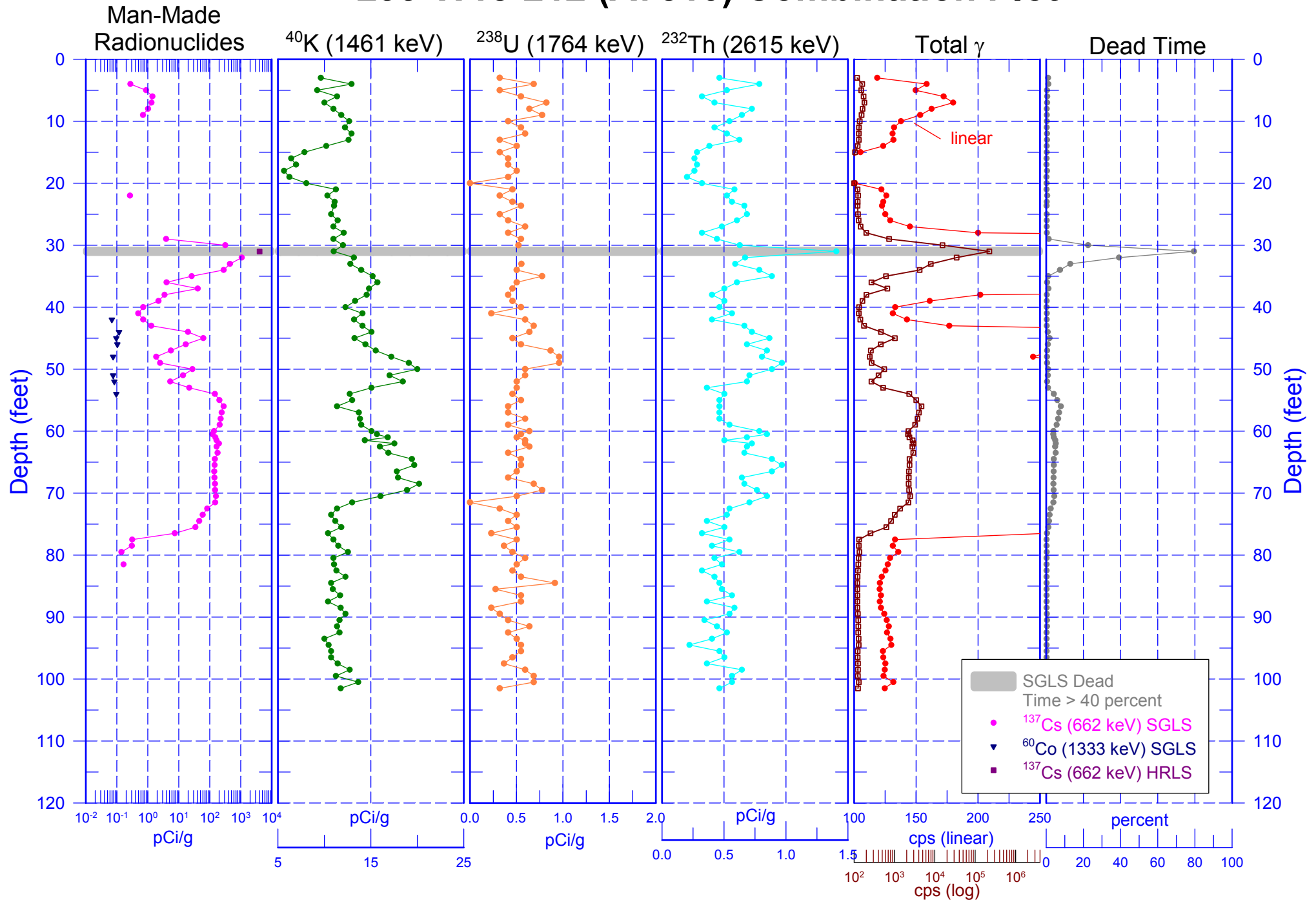


299-W15-212 (A7510)

Natural Gamma Logs

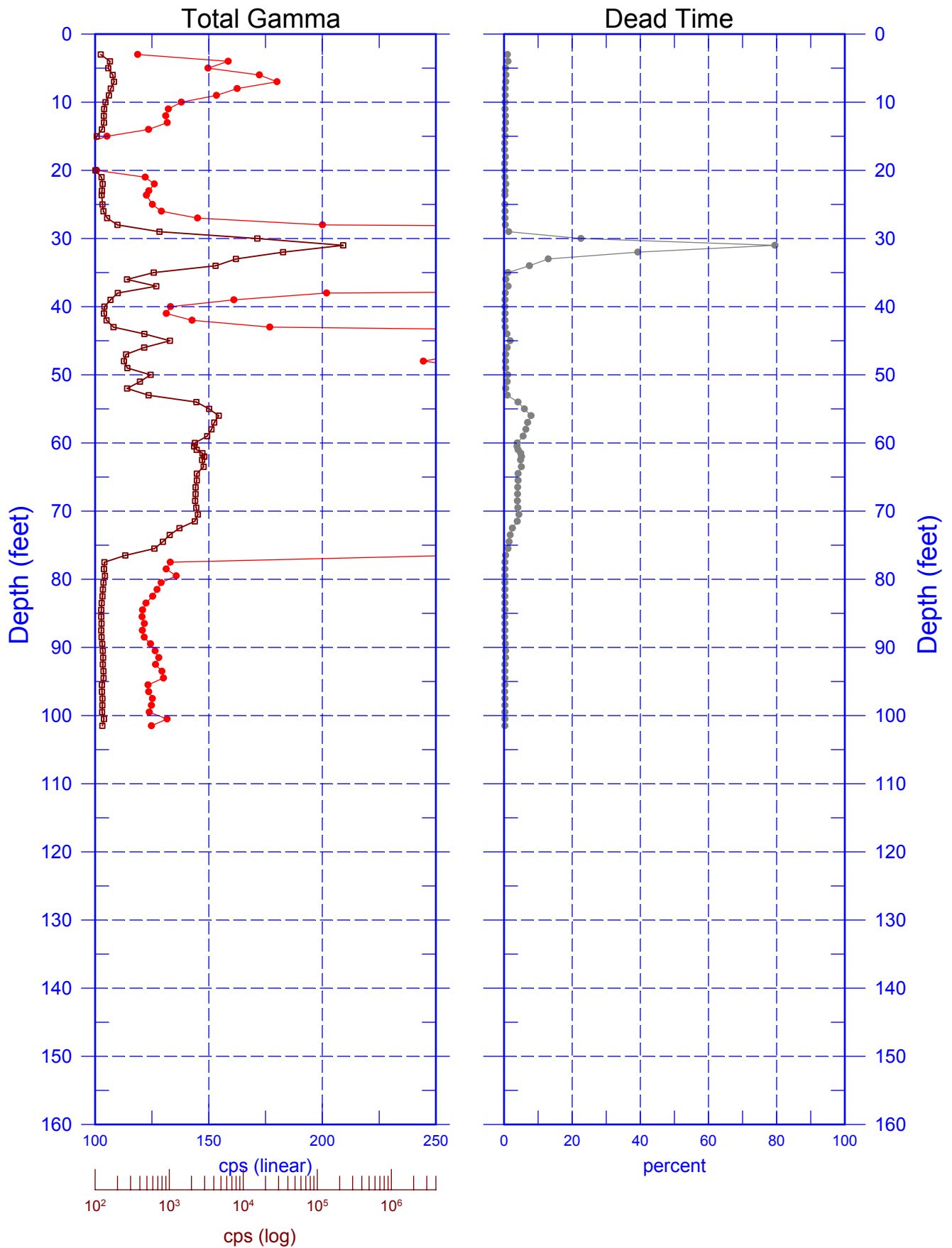


299-W15-212 (A7510) Combination Plot



299-W15-212 (A7510)

Total Gamma & Dead Time



299-W15-212 (A7510)

Rerun of Natural Gamma Logs

